Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communication Requirements through the Year 2010	)	WT Docket No. 96-86

To: The Commission

COMMENTS OF KENWOOD USA CORPORATION IN RESPONSE TO SEVENTH NOTICE OF PROPOSED RULE MAKING

Kenwood USA Corporation ("Kenwood"), a major manufacturer of communications equipment for, among other purposes, public safety land mobile communications systems, hereby respectfully submits its comments in response to the *Seventh Notice of Proposed Rule Making* (the "Notice"), FCC 05-9, released January 27, 2005, 70 Fed. Reg. 21726 *et seq,.* in the above captioned proceeding. The Notice proposes, among other things, to adopt a single, proprietary standard for 700 MHz wideband data spectrum that would be mandatory for all mobile and portable radios operating on wideband interoperability channels. For its comments on this issue in particular, Kenwood states as follows:

I. INTRODUCTION

1. The Commission has previously determined that, in order to achieve proper interoperability on the 700 MHz *narrowband* channels, a single interoperability

standard must be implemented. Therefore, in 2000, the Commission adopted Project 25 Phase I as the standard for the 700 MHz *narrowband* interoperability channels, as proposed by the Public Safety National Coordination Committee ("NCC"). The Commission held at the time, however, that additional work was needed on a wideband standard, and that it would be premature to adopt any wideband interoperability standard. In 2003, the NCC considered and recommended to the Commission a single standard for the 700 MHz *wideband* interoperability channels, known as TIA-902, or Scalable Adaptive Modulation (SAM)[1]. SAM is a proprietary technique allowing high-speed, wireless data communication. SAM is an Orthogonal Frequency Division Multiplex (OFDM) spread spectrum technique using Quadrature Amplitude Modulation (QAM). As such, it requires incorporation of special amplifiers and circuitry in the transmitters and receivers. Implementation of SAM as a standard for all mobile and portable radios operating on wideband interoperability channels would require reconstruction of radios to contain the unique components and circuitry that are necessary for appropriate SAM operation. It has a series of additional drawbacks which make its adoption as a mandatory standard inadvisable.

2. The Commission believes that there should be rules governing interoperability for both wideband and narrowband channels, and therefore, proposes (1) to adopt SAM as the wideband interoperability standard, and (2) to mandate that all public

[1] First R&O, 14 FCC Rcd at 204 ¶ 113.

safety mobile and portable radios[2] operating on the 700 MHz Public Safety Band interoperability channels use it[3]. The Commission solicits comments regarding adoption of SAM as the *single* standard for 700 MHz *wideband* interoperability channels and the requirement of all mobile and portable radios operating on these channels to apply this standard.

3. The Notice, at paragraph 50, claims that the SAM standard was adopted by "industry consensus." This is inaccurate. In the *ex parte* filing in this proceeding by Kathleen M.H. Wallman, Esquire, Chair of the NCC dated July 25, 2003 addressed to then-Chairman Powell, it was reported that, at its July 17, 2003 meeting, the NCC reached what Wallman referred to as a "qualified consensus" that most wideband data equipment should be capable of operating on the interoperability channels using the TIA-902 (SAM) standard. The letter goes on to note that M/A Com noted that providing such capability was technically feasible but would increase the cost of the product. M/A Com did not oppose the recommendation. However, Dataradio, another manufacturer, did disagree with the standard as a requirement, and though that dissent was noted in Wallman's letter, the NCC continued to claim that the standard was an "industry consensus." The Notice in this proceeding failed to note the Dataradio dissent or the concerns of M/A Com as participants in the NCC.

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[2]The Commission proposes an exception for special-purpose equipment where the modem is integral to the special-purpose device (*i.e.,* a non-detachable component in a common enclosure or case).

[3] See, the Notice at ¶ ¶ 50, 53.

4. The Notice, at paragraph 52, states that the Commission has concluded that the rules governing interoperability channels should be similar for wideband and narrowband mobile and portable radios, and thus that the SAM standard should be adopted for wideband mobile and portable radios. It is unclear why the Commission concluded that the rules should be similar for both narrowband and wideband 700 MHz operation. The functions of wideband and narrowband emission modes are dissimilar, and the justifications for interoperability in narrowband voice operation (which Kenwood does not question) do not translate to wideband data emissions.

II. WIDEBAND INTEROPERABILITY IS UNNECESSARY AT 700 MHz

5. Voice interoperability has unquestioned value in public safety communications. The same does not necessarily hold true for wideband data. Even if radios are able to communicate with each other using a common standard, the software applications used by Public Safety are not necessarily interoperable. At the NCC meetings where this was discussed, the only reported justification for wideband data interoperability was short messaging between public safety officers in a talk around mode. This is not done as a practical matter. Each wideband radio type may require a unique operating system, which depends on factors such as area (i.e. urban or rural), type of communication handled, and the frequency of communications with other organizations. Currently, Public Safety radios use such a wide range of wideband operating systems that they cannot be interoperable. To the extent that wideband interoperability is necessary or desirable, the 4.9 GHz

band offers a viable, cost-effective solution: in effect, a private Wi-Fi system for public safety, that incorporates all necessary interoperability at the scene of an incident. This is an alternative whose core technology and product advancements are being driven at lightning speed by the highly competitive consumer market sector.

6. It is suggested, therefore, that a wideband interoperability standard at 700 MHz is not justified by the record to date. Given the costs of incorporation of the SAM standard in wideband radios, and the fact that SAM is a proprietary standard that increases costs while stifling competition, the Commission should not proceed with the Notice proposal in this respect.

III. THE COMMISSION SHOULD NOT ADOPT SAM AS A SINGLE STANDARD FOR WIDEBAND INTEROPERABILITY CHANNELS

7. The communications industry and Public Safety community have patiently awaited access to the 700 MHz spectrum. Now that this spectrum is available, Public Safety deserves to benefit from its use as soon as possible. However, mandating incorporation of the SAM standard significantly complicates the equipment, increases the cost of it, and will delay rollout of wideband data at 700 MHz. Currently, there is no equipment available which incorporates the SAM standard. It is unclear when such equipment will be ready for deployment and use by Public Safety entities. To date, it is only in prototype form for a pilot project in Florida. Mandating the SAM standard without equipment availability is

inadvisable. Furthermore, given the pace of high-speed data development, the SAM standard may become obsolete before its full deployment and adoption by more than a few users.

8. As mentioned above, the SAM technique requires use of linear power amplifiers. The linear amplifiers are expensive components, especially when used with high power devices/stations as required by Public Safety. The resulting aggregate cost increase for adding SAM is currently estimated at 30% per radio. This cost increase does not include additional components such as receiver parts, filtering, semi-conductors, systems-on-a-chip (SOCs) and Software Defined Radio (SDR) technologies. The cost is not justified and stands to impose a burden on public safety licensees without a concomitant benefit.

9. Estimates of costs regarding additional power modules and receiver components cannot be firmly determined, since the equipment is not yet available in the market. Until parts and semi-conductor manufacturers experience a sizable demand for 700 MHz components, they will not design, develop or produce these parts. In the next several years, 700 MHz parts and semi-conductors will not be plentiful from multiple sources. Moreover, the available components will have premium costs. Additional regulatory mandates on manufacturers stand to reduce the already low supply and substantially increase costs.

10. Manufacturers of RF-modem and radio equipment desiring to implement 700 MHz Narrowband/Wideband or Wideband only data transceivers would have to incorporate SAM standards into their existing operating systems.

Implementation of SAM into existing radios may require not only incorporation of linear amplifiers, but also installation of additional transceivers, SAM compatible, in each radio. Such dual equipment in one "box" will drive the costs and complexity of the products up, to the point that it will reduce marketability. It is apparent that reconstruction of existing techniques to include the SAM standard would not only increase the costs, but it may also encourage SAM-only wideband data equipment market. This would monopolize the market and counter the goal of improving public safety solutions. Such situation may render radio equipment too expensive for many Public Safety services.

11. The technique implemented in SAM substantially reduces the current geographic range covered by Public Safety radios. Reduced coverage would require construction of additional radio base stations in order to supply comparable Public Safety services. In simple terms, to maintain the current Public Safety services coverage, implementation of SAM would necessitate construction of additional four radio stations for every existing one.

12. It may not be an issue in urban areas, where public safety users already utilize multiple sites. However, it would have a major cost impact on rural systems, if they have to build additional sites only to comply with SAM standard. Again, such expenses would put SAM equipment out of reach for many law enforcement agencies and reduce the effectiveness of their services.

13. The novel nature of the SAM technology and its complex components will pose high maintenance costs. The additional infrastructure and network will

multiply man-hour operation and maintenance costs. The additional engineer and technician training; purchase of SAM-capable SYSOP, Management and Troubleshooting software; and specialized SAM service monitoring and test equipment (none of which presently exist) clearly implicate high and currently unspecified budgetary costs. These costs may be far higher because the training, software and equipment may be initially available only from the SAM technology originator at a premium price.

14. Since development of SAM is not complete, and it is currently unavailable, its overall final projected costs are unknown. However, even though the price is unavailable, there are no reasonable grounds to believe that the final cost would be inexpensive. Namely, due to the projected complexity of the SAM system, and the list of unique components, that includes base station data transceivers, base station data controllers, mobile data terminals, mobile PC application software, dispatch equipment and software, system management software, special video applications hardware and software, and integration of the above with trunked network systems, host systems, NCIC ,and state crime databases, the likely expense of a Public Safety agency is to be sizeable. Mandate of the SAM standard with no known approximations on complexity, costs and real world performance would be perilous to the Public Safety community.

15. A strong economic market is characterized by the variety of its products and manufacturers. Competition drives manufacturers to offer feature-rich and high-performance solutions for entities of varying size, jurisdictions and budgets. Lack

of such competition not only drives up products' costs, but it also stifles innovation. Currently, SAM is proprietary technology, owned by a single company. Imposing a single proprietary standard on all manufacturers creates a restraint on competition in production of wideband radios in the 700 MHz band. This situation will reduce the incentive of manufacturers to produce products for 700 MHz wideband channels, drive the final costs up, and place 700 MHz wideband equipment out of reach of smaller jurisdictions.

16. In addition to elimination of competition and increased costs, implementation of a standard owned by a single company will eliminate any incentive to develop more innovative technologies. Many companies that are currently developing products for the 700 MHz wideband spectrum will be pushed out of the market without the opportunity to recover any return on investment, and economic losses will lessen any incentive for further development or innovation. Other manufacturers will be forced to focus their technology and product development resources to non-public safety markets, and the portable and mobile radio manufacturers with Public Safety as a core business sector will suffer from an uneven playing field and static market.

17. Currently, the owner of SAM is holding three patents, which are essential for SAM operation[4]. Since SAM technology is legally owned and protected by its

[4] The patents are US 5,519,730 - Communication signal having a time domain pilot component (this patent teaches a QAM transmission and reception methodology wherein a time domain pilot reference is advantageously associated therewithal); US 5,381,449 - Peak to average power ratio reduction methodology for QAM communications systems (this patent teaches a QAM peak to average power ratio reduction methodology by pre-selecting magnitudes and phase angles for pilots used in N-Level QAM systems); US 5,343,499 -

creators, the only access to it may be through authorization. Specifically, SAM might be developed, manufactured, and marketed by a sole company, or its intellectual property rights ("IPR") can be licensed, allowing other companies to develop, manufacture and market this technology, while paying royalty fees to the licensor. However, even if SAM technology is licensed, the system becomes a *de facto* monopoly. Motorola is the dominant systems manufacturer for complex large Public Safety systems as evident in their analog and P25 Phase I deployed systems. Even now, only Motorola offers full P25 Phase I trunked network systems and simulcast systems. Because of this dominance, smaller manufacturers have been relegated to offering only P25 subscriber units and P25 single site repeater/base stations for certain market segments. More often than not, smaller manufacturers can only participate as second-tier or add-on subscriber and ancillary equipment vendors into existing P25 (Motorola) systems. This same dominance will exist for the 700 MHz Public Safety band. Furthermore, should Motorola inextricably tie their 700 MHz band infrastructure designs to include SAM data support either by engineering means or sales processes or both, this will in essence mean that the vast majority of the most prominent 700 MHz Public Safety communications systems will require SAM-only wideband data equipment. This presents a disadvantage for other manufacturers:

Quadrature amplitude modulation synchronization method (this patent teaches a simplified method for acquiring timing and synchronization for a QAM receiver with improved AFC control signal generation).

a. This dominance and the tentative conclusion to require the SAM standard on the Wideband Data Interoperability channels will, *de facto,* require manufacturers to produce SAM-capable equipment if they are to compete in any capacity for sales on these prominent 700 MHz PS systems.
b. The proposed amendment to require any Wideband Data capable radio to also operate on the Wideband Interoperability channels will sanctify SAM as the "only acceptable" data technology for the 700 MHz band, thereby excluding any other data technology as a possible solution for Public Safety users.
c. There is a time-to-market disadvantage. Even if a manufacturer decides to produce SAM- capable equipment, it will have to wait in the wings for Motorola SAM data systems to be deployed before entering the 700 MHz Wideband Data market.
d. Non-Standard Features/Operations: These dominant 700 MHz Wideband systems have the high potential to have Motorola-unique proprietary software applications, operations, host database and dispatch console interfaces that exist outside the TIA-902 SAM standards. These proprietary aspects will become favored by the customer or unknowingly assumed as part of the standard. Other manufacturers cannot offer these non-standard aspects and therefore will not be able to compete.

18. Furthermore, licenses to intellectual property rights are not exact designs or development descriptions. Licensees would still have to evaluate the standard, research, develop, prototype, test and source parts in order to produce equipment using the SAM standard. Additionally, the licensees would have to wait until access can be gained to an actual operational SAM data system before proper field-testing can be done. This will put all licensees at a developmental disadvantage and forces them to enter the market at a late stage.

19. Even if manufacturers acquire the IPR license to use SAM, there is no guarantee of compatibility with the “parent” SAM system. The Licensor is required neither to provide nor disclose to the licensee any technological improvements in the licensed technology. As a result, the Licensor may implement new infrastructure features, operation or performance factors that are

directly or indirectly related to the licensed technology and result in operational problems while implementing the system. This in turn will make the licensee's product appear incompatible with the system and/or non-compliant with the standard. Moreover, a licensor is not obligated to make clear differentiation between the standard and its unique system aspects. This would enable the licensor to incorporate unique features, operations and/or performance aspects in their own systems and peripheral equipment. Since differentiation between the actual standard and manufacturer-unique aspects outside the system layers may become blurred, the Public Safety user unknowingly will be forced to accept the Licensor's additional features as part of SAM standard. Finally, licensees of proprietary technology are likely to pay up-front license fees and royalties per unit sold, providing the licensor with their accounting records for units sold verification. This practice would place the licensee at distinct sales and marketing disadvantage, informing the licensor of the sales and profits figures.

20. SAM technology closely resembles iDen technology. Both technologies utilize QAM and combine digital signals with paging and two-way radios in one device. However, this similarity should be a critical warning sign as to SAM's operation. More specifically, the introduction of iDEN system to the cellular network in the 800 MHz spectrum created harmful electrical interference to analog 800 MHz systems. In fact, iDEN was identified among the primary causes of interference to police, fire, and other public safety radios in the 800 MHz spectrum. [5] This

[5] The iDEN system was created for the cellular network, which consists of low power devices. Interference created by iDEN in low power devices may be magnified by several orders, when

interference potential should be fully explored in advance of any authorization of SAM, much less mandating it as the wideband interoperability standard at 700 MHz.

IV. THERE ARE OTHER VIABLE TECHNIQUES FOR PUBLIC SAFETY WIDEBAND COMMUNICATION

21. An alternative option is the 4.9 GHz band. The new 4.9 GHz band is spectrum allocated to Public Safety. This band combined with mesh networking techniques allows sending voice, data, and video using inexpensive[6] wideband devices. More importantly, it allows relay of data between units that are out of range using high-speed ad-hoc networks, a capability that eliminates the need for wideband radio interoperability in the 700 MHz spectrum.

22. Another option is to retain the current Interoperability (SAM standard) channels and re-allocate 14 of the Reserved Wideband Data channels for Interoperability-Open Technology use. Another option is to stay the current rules and re-allocate some of the 14 reserved channels as an "interim measure." It will enable the FCC to revisit this issue and re-adjust the allocations at a later date, when it can be demonstrated that Public Safety users have established a clear pattern of usage for the Interoperability (SAM) channels and/or the Interoperability

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iDEN-similar system is incorporated into high power devices. Therefore, SAM, which is intended for public safety mobile radios (in the range of 25-30 watts) and base stations (approximately 100 watts) may cause intolerable interference.

[6] 4.9 GHz equipment is inexpensive since it is based on high volume Wi-Fi chip sets.

Open Technology channels[7].

23. Should the Commission proceed with the Notice proposal -- which Kenwood believes that it should not -- to mandate 700 MHz wideband radios to also operate on the wideband interoperability channels using SAM, then it should instead make SAM a condition of licensing and licensed emissions. It should not be imposed on manufacturers as a necessary capability in order to obtain a grant of Equipment Authorization. This would will afford some relief for manufacturers to offer cost-effective narrow and wideband radio products for public safety capable of operating on all the narrowband General Use channels, narrowband interoperability channels, wideband General Use channels and wideband reserved channels without the burden and cost of also including SAM technology as a condition of certification of the devices.

IV. CONCLUSION

23. The proposed rules mandating a single SAM standard for all mobile and portable radios in the 700 MHz wideband interoperability spectrum should not be adopted. Mandating SAM for all wideband capable radios is a solution without a problem, and will impose unnecessary costs without concomitant benefits on Public Safety users. Mandating a proprietary standard that is neither feasible nor accessible to the Public Safety community is anticompetitive and stifles access to the new band. Even if a proprietary standard was a good idea generally, SAM's complex, unavailable technology stands to force manufacturers out of the market

[7] Such data can be easily obtained from the FCC licensing database.

and impose unnecessary expenses on the Public Safety community.

24. Should the Commission, notwithstanding the foregoing, still see fit to adopt the proposed rules mandating the SAM standard, it must at least take steps to insure that SAM is offered to competitors of the holder of the patents on reasonable terms to insure a timely and competitive development of products by multiple manufacturers. Only in this way would competitive markets exist for wideband equipment at 700 MHz.

Therefore, the foregoing considered, Kenwood USA Corporation respectfully requests that the Commission not proceed with the adoption of the rules regarding a wideband data interoperability standard for the 700 MHz band as proposed in the Notice. Rather, it should revisit both the need for wideband interoperability and permit competitive technologies for the benefit of the Public Safety community at 700 MHz.

Respectfully submitted,

KENWOOD USA CORPORATION

By: /s/Christopher D. Imlay
Christopher D. Imlay
Its Regulatory Counsel

Booth, Freret, Imlay & Tepper, P.C.
14356 Cape May Road
Silver Spring, MD 20904-6011
301-384-5525

Kenwood USA Corporation

3975 Johns Creek Ct., Suite 300
Suwanee, GA 30024
(678) 474-4700

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